

LISTING OF CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of determining a treatment program for a subject, the method being performed by a processing system, the method comprising:

a) obtaining subject data, the subject data representing the subject's condition;

b) analyzing, using the processing system, the subject data and a model of the condition to determine system values representing the condition;

c) determining, using the processing system, one or more solution trajectories representing the progression of the condition in accordance with the model and the determined system values; and[[,]]

d) determining a treatment program in accordance with the determined solution trajectories.

2. (Previously Presented) A method according to claim 1, the subject data representing a medical condition for the respective subject, the method comprising determining solution trajectories representing the progression of the medical condition within the subject.

3. (Previously Presented) A method according to claim 1, each system value representing a quantity obtained for the measurement of a respective attribute of the condition, the system values comprising:

a) state variable values representing rapidly changing attributes; and

b) parameter values representing slowly changing or constant attributes.

4. (Previously Presented) A method according to claim 1, the method comprising determining control variable values, the control variables representing attributes of the condition that can be externally controlled.

5. (Previously Presented) A method according to claim 4, the model comprising one or more model equations representing the condition, the method comprising determining one or more subject equations in accordance with the model equation(s) and the system values.

6. (Currently Amended) A method according to claim 5, the method of determining the treatment program comprising:

a) evaluating the behavior of solution trajectories representing solutions of the subject equations;

b) determining a set of target points, the target points comprising stable points for the subject equation(s); and[[,]]

c) determining one or more control programs, each control program comprising a sequence of control variable values that result in solution trajectories having desired behavior comprising at least one of:

i) the solution trajectories are acceptable based on predefined criteria;

ii) the solution trajectories do not move away from the target points; and[[,]]

iii) the solution trajectories finally approach the target points.

7.–8. (Cancelled)

9. (Currently Amended) A method according to claim 6, the method comprising determining the solution trajectories to be acceptable if the solution trajectories are:

a) non-chaotic ~~Non-chaotic~~; and,

~~b) Sufficiently~~ sufficiently smooth so that the solution trajectories represent progressions of the condition that do not adversely affect the subject.

10. (Currently Amended) A method according to claim 6, the method of evaluating the behavior of the solution trajectories comprising:

a) determining regions of control variable and/or parameter values for which the solution trajectories are chaotic; and[[,]]

b) determining ranges of the control variable and/or parameter values for which the solution trajectories can be made non-chaotic, or otherwise stabilized.

11. (Previously Presented) A method according to claim 10, the method comprising determining one or more control programs in accordance with the determined ranges.

12. (Previously Presented) A method according to claim 10, the method comprising using a Liapunov function to determine the one or more control programs.

13. (Currently Amended) A method according to claim 12, the method comprising:

a) defining a Liapunov function for which the gradient defines solution trajectories moving towards the target points;

b) defining constraints on the control variable values; and[[,]]

c) determining control variable values that result in solution trajectories travelling down the gradient of the Liapunov function in accordance with the constraints.

14. (Previously Presented) A method according to claim 13, wherein the constraints comprise limits on the treatment that can be provided to the subject.

15. (Currently Amended) A method according to claim 10, the method comprising determining a treatment in accordance with one or more of the determined control programs by:

a) viewing a representation of the solution trajectories, the representation comprising an indication of the chaotic regions; and[[,]]

b) selecting a control program in accordance with the represented solution trajectories.

16. (Currently Amended) A method according to claim 6, the method comprising:

a) determining one or more Nature values, the Nature values being quantities of Nature parameters and/or variables representing attributes of the condition that will cause the condition to progress in an undesirable manner;

b) modifying the subject equations to incorporate the one or more Nature values;

c) evaluating the behavior of modified solution trajectories representing solutions of the modified subject equations; and[[,]]

d) performing at least one of:

i) determining one or more control programs, each control program comprising control variable values that result in modified solution trajectories having desired behavior; and[[,]]

ii) determining a set of undesired points, the undesired points comprising unstable points for the subject equation(s); and[[,]]

iii) determining one or more undesired programs, each undesired program comprising Nature values that result in modified solution trajectories having undesired behavior comprising at least one of:

(1) the modified solution trajectories are unacceptable based on predefined criteria;

(2) the modified solution trajectories do not move away from the undesired points; and

(3) the modified solution trajectories finally approach the undesired points.

17. (Currently Amended) A method according to claim 16, the method comprising, using the modified solution trajectories, the method of evaluating the behavior of the solution trajectories comprising:

a) determining regions of control variable and/or parameter values for which the solution trajectories are chaotic; and[[,]]

b) determining ranges of the control variable and/or parameter values for which the solution trajectories can be made non-chaotic, or otherwise stabilized ~~stabilised~~.

18. (Cancelled)

19. (Currently Amended) A method according to claim 17, the method comprising:

a) defining a second Liapunov function for which the gradient defines modified solution trajectories moving towards the undesired points;

b) defining constraints on the Nature values; and[[,]]

c) determining Nature values that result in modified solution trajectories travelling down the gradient of the second Liapunov function in accordance with the constraints.

20. (Previously Presented) A method according to claim 19, the method comprising determining the treatment program in accordance with control programs and the Nature programs by:

a) determining starting points having modified solution trajectories for which control programs exist;

b) determining starting points having modified solution trajectories for which Nature programs exist;

c) viewing a representation comprising at least one of:

- i) the modified solution trajectories;
 - ii) the starting points; and[[,]]
 - iii) the chaotic regions; and[[,]]
- d) selecting a control program in accordance with one or more represented solution trajectories.

21. (Currently Amended) A method according to claim 2, the method comprising determining parameter values by:

- a) determining a partial set of system values from the subject data;
- b) selecting one or more models, each model comprising one or more equations representing the effect of a condition on a subject;
- c) ~~determine~~ determining a complete set of system values in accordance with the determined partial set of system values and the respective equations; and[[,]]
- d) selecting a model in accordance with the determined complete set of system values.

22. (Currently Amended) A method according to claim 21, the step of determining the complete set of system values comprising:

- a) determining a candidate set of system values in accordance with the determined partial set of system values and the equations;
- b) comparing the candidate set of system values to at least one of:
 - i) the partial set of system values; and[[,]]
 - ii) predetermined thresholds; and[[,]]
- c) selecting the model in accordance with the result of the comparison.

23. (Currently Amended) A method according to claim 1, the method comprising:

a) determining stability sets; and[[,]]

b) determining the treatment in accordance with the stability sets.

24. (Previously Presented) A method according to claim 23, wherein the stability sets represent combinations of state and parameter values for which the resulting solution trajectories are acceptable.

25. (Previously Presented) A method according to claim 23, the method comprising determining a control program in accordance with the stability sets.

26. (Currently Amended) A method according to claim 24, the method comprising:

a) considering subject state variable and parameters values for the subject;

b) determining modification of the state variable and parameter values required such that the subject's state variable and parameter values fall within the stability sets; and[[,]]

c) determining the treatment program in accordance with the required modification of the state variable and parameter values.

27. (Previously Presented) A method according to claim 22, the method comprising determining a medication dosage regime in accordance with the determined stability sets.

28. (Previously Presented) A method according to claim 1, the method comprising determining a control program using one or more of:

a) Liapunov functions;

b) dynamic optimization techniques;

c) convex set algorithms.

29. (Previously Presented) A method according to claim 1, wherein the subject is a patient.

30. (Previously Presented) A method according to claim 1, wherein the treatment is the administration of medication.

31. (Cancelled)

32. (Currently Amended) Apparatus for determining a treatment program for a subject, the apparatus comprising a processing system adapted to:

- a) obtain subject data, the subject data representing the condition;
- b) analyze the subject data and a model of the condition to determine system values representing the condition;
- c) determine one or more solution trajectories representing the progression of the condition in accordance with the model and the determined system values; and[[,]]
- d) determine a treatment program in accordance with the determined solution trajectories.

33.–36. (Cancelled)

37. (Currently Amended) A method according to claim 1, wherein the step of analyzing the subject data comprises:

- a) determining a partial set of system values from the subject data, each system value representing a quantity obtained by the measurement of a respective attribute of the condition;
- b) determining a plurality of models, each model comprising one or more equations representing the effect of a condition on a subject;
- c) ~~attempting to calculate~~ calculating a complete set of system values in accordance with the partial set of system values and the respective equation, for each model; and[[,]]
- d) selecting one model of the plurality of models in accordance with the determined complete set of system values.

38. (Currently Amended) A method according to claim 37, wherein the system values comprise:

- a) state variable values representing rapidly changing attributes; and
- b) parameter values representing slowly changing or constant attributes.

39. (Currently Amended) A method of claim 37, wherein calculating the method of attempting to determine the complete set of system values comprising; comprises:

- a) determining a candidate set of system values in accordance with the determined partial set of system values and the equations; [[and,]]
- b) comparing the candidate set of system values to at least one of[[;]] the partial set of system values[[;]], and[[,]] predetermined thresholds; and[[,]]
- c) selecting the model in accordance with the result of the comparison.

40.–45. (Cancelled)

46. (Currently Amended) A method according to claim 1, further comprising the step of determining the effectiveness of treatment provided to a subject, the effectiveness determination comprising:

- a) repeating the steps of obtaining subject data and analyzing the subject data to determine modified system values;
- b) comparing the system values and the modified system values; and[[,]]
- c) determining the effect of the treatment in accordance with the results of the comparison.

47.–52. (Cancelled)